Meeting Summary:

Conceptual Alternatives Meeting #2 - Discussion with Snohomish County Staff

MEADOWDALE BEACH COUNTY PARK FEASIBILITY STUDY

Meeting Date and Time: Thursday, February 26, 2015, 8:30 am to 10:30 am

Attendees

Snohomish County Staff	**Consultant Team**
• Logan Daniels • Sharon Swan • Kathleen Herrmann • Tom Teigen • Doug Dailer, Park Ranger • Frank Leonetti • Dave Lucas • James Yap • Russ Bosanko	• Peter Hummel (Anchor QEA) • Kathy Ketteridge (Anchor QEA) • Paul Schlenger (Confluence)

Meeting Purpose

Kathy provided an overview of the meeting purpose, which was to discuss the three proposed alternatives in terms of recreational/ADA access and habitat restoration opportunities. The size and type of potential openings through the BNSF railroad berm were discussed during a previous meeting with the County on January 15, 2015.

Brief Overview of Preliminary Hydraulic Modeling:

Kathy provided a brief overview of results of preliminary hydraulic modeling conducted by Anchor QEA to evaluate the opening width (through the railroad berm) required to allow unimpeded transport of sediment at high flows. Sediment loads were estimated by Shannon and Wilson; as part of the geotechnical studies included in the project scope of work. Hydrology was taken from the County's 2002 Puget Sound Tributaries Drainage Report, which suggests a 100-year flow of approximately 130 to 150 cfs at the mouth of the creek, which matches hydrology within the Hec-Ras model of the creek provided to Anchor QEA by the County. Photos of the site show flooding that implies the flow during those events was higher than 150 cfs; therefore additional modeling was done at 200, 300 and 400 cfs as part of a sensitivity study. Due to uncertainties in predicted hydrology and groundwater input to the system, and photographic evidence of severe flooding not explained by a 150 cfs flow, a flow of 300cfs was used to size the minimum bridge

opening[1]. The results of the preliminary modeling illustrate that an opening of at least 20 feet is required to pass sediment through the opening during a 300 cfs flow.

Discussion of "Minimum Opening":

Logan led a discussion with the group to determine what should be used as the smallest opening size through the railroad berm for the range of proposed alternatives. The group decided that 30 feet should be the minimum clear span used for the proposed alternatives. This is slightly larger than the 20 foot minimum opening size determined from preliminary hydraulic modeling. This additional width is provided to account for potential future increases in sediment load into the system and sea level rise and to match the approximate bank-full width for the creek that exists upstream of the footbridge.

Description of Proposed Concepts

The consultant team prepared three concepts for discussion. Plan and section views were provided at the meeting to illustrate the concepts. The three concepts are described below:

- Alternative 1: A three span bridge with a 25-foot clear span and two 25' abutment spans. Creek outlet provided through the clear span and the north abutment span. Pedestrian access provided in the south abutment span (10-foot walkway width). The walkway height would be optimized to provide up to 7 feet of vertical clearance; but would be inundated during higher tides.
- Alternative 2: Retain the existing tunnel for pedestrian access and build a three-span bridge to the north of the tunnel location for the creek outlet. The bridge is the same size as for Alternative 1 above. The existing tunnel bottom would be modified to optimize the vertical clearance[2], but would be inundated during higher tides.
- Alternative 3: A four span bridge with two 40-foot clear spans and two 25' abutment spans. Creek outlet provided through the clear span and the north abutment span. Pedestrian access provided in the south abutment span (10-foot walkway width). The walkway height would be optimized to provide up to 6 feet of vertical clearance to maximize the amount of time the walkway would not be inundated by creek flows. The walkway in this alternative would be inundated during extreme high tides only.

[1] *Not discussed at the meeting*: Previous hydrology developed in 1989 by the County (Lund's Gulch Basin Report) prior to construction of the 152nd Street retention pond estimated hydrology at the mouth of the creek to be almost double what predicted in the 2002 report. The 100-year flow was estimated as approximately 300 cfs at the mouth of Lund's Gulch Creek in the 1989 report.
[2] *Not discussed at the meeting*: The existing culvert geometry is provided in Table B-1 of the 2002 County Drainage Report. Invert elevation of walkway upstream is 11 ft NAVD88 and downstream is 9.6 ft NAVD88. Invert elevations of the bottom of the culvert are 9.5 ft and 8.1 ft NAVD88, respectively.

Discussion of Proposed Concepts

The group discussed each of the concepts and provided input on the concepts, comments on the plan/section view figures, and suggestions for modifications to the draft concepts. Key comments from the discussion included the following:

- Vertical clearance and the elevation of the walkway for pedestrian access need to be precisely defined. It is important to understand how often the walkway (percent of the year) would be inundated by the tide at different elevations relative to allowed vertical clearance.
- The possibility of adding an additional pedestrian access walkway through the northern abutment span was discussed. However, there was concern that this trail extension would segregate habitat areas in that portion of the site therefore it was not carried forward.
- The proposed new pedestrian footbridge upland of the embankment needs to be adequately sized (both in width and height) to accommodate flows and sediment transport capacity similar to the new bridge through the railroad berm. We anticipate that the total width of the new pedestrian bridge will be approximately 40 feet.
- The wetland area to the north of the site adjacent to the railroad berm should be re-connected to the creek; currently it is separated from the main channel of the creek by the existing pathway.
- There will be a transition area from beach substrate (gravels and sands) to vegetated wetland upstream of the new opening. The size of this transition area will be dependent on the sediment load in the creek and the size of the bridge opening. It will also be dynamic; as sediment is transported through the system cyclically due to high flow events.
- Sediment transported through the creek and out onto the beach will have some retention time at the mouth of the creek within the new outlet. The retention time will depend on the frequency and magnitude of high flow events in the creek. This is a natural process and will have some unpredictability associated with it. However, it is a goal of this project to create an opening that can transport the predicted sediment load out onto the beach
- The creek upstream of the existing foot bridge appears to have a relatively natural alignment. The creek downstream of the footbridge is constrained by several rock and wooden control structures, some of which are not functioning well. The creek below the footbridge should be re-aligned as part of construction of the project to more natural configuration in the proposed alternatives.
- The habitat and recreational features shown for the three alternatives could be "mixed and matched" with a different opening size/type through the railroad berm. However, the larger habitat area shown for alternative 3, which has the

largest bridge opening, would likely be needed to accommodate the larger bridge opening and subsequent larger migration zone for the creek through the opening.

- While Alternative 2 is merited as a conceptual alternative because it provides additional separation between the creek and pedestrian access, s; the existing tunnel may be problematic for several reasons including height restrictions, potential migration of the relocated creek back towards the opening and potentially experiencing inundation from the same tides as the other openings.
- "Dead-end" picnic areas shown on several of the alternatives at the terminus of the northern trail would provide benefit to large groups visiting the park, such as educational programs, by providing a place to congregate off the main trail. There is some concern that these terminus areas could provide a safety concern for the public. Therefore, they were removed from Alternative 2; but were left in Alternatives 1 and 3 for consideration and evaluation as part of the Recreation and ADA Needs study.
- The existing volleyball court is not heavily used by park visitors.
- Views of the water from areas in the park east of the railroad berm may be hindered somewhat by the lower beams supporting the new bridge.
- Vertical clearance requirements for ADA access based on local and/or federal regulations may not be met for some alternatives in order to maximize the vertical height of the pathway to keep it out of the creek flows.
- Plan views should highlight all of the lawn area available for each alternative; even if no modifications to those lawn areas are proposed. Plan views should also show the park boundary.

Next Steps:

- The consultant team will revise plan and section views of proposed alternatives based on results of this meeting and will submit revised plan/section views for the three proposed alternatives to the County. Revised concept figures are provided in Attachment 1 to this meeting summary.
- The consultant team will move forward with all of the studies as outlined in the scope of work (Task 5) to evaluate feasibility of the three revised concepts.
- The consultant team will move forward with collecting survey data on site as required to fill data gaps (e.g. height of the rail, geometry of the existing tunnel, channel thalweg elevations, etc.).

Attachments: Revised Plan and Section Views for Conceptual Alternatives

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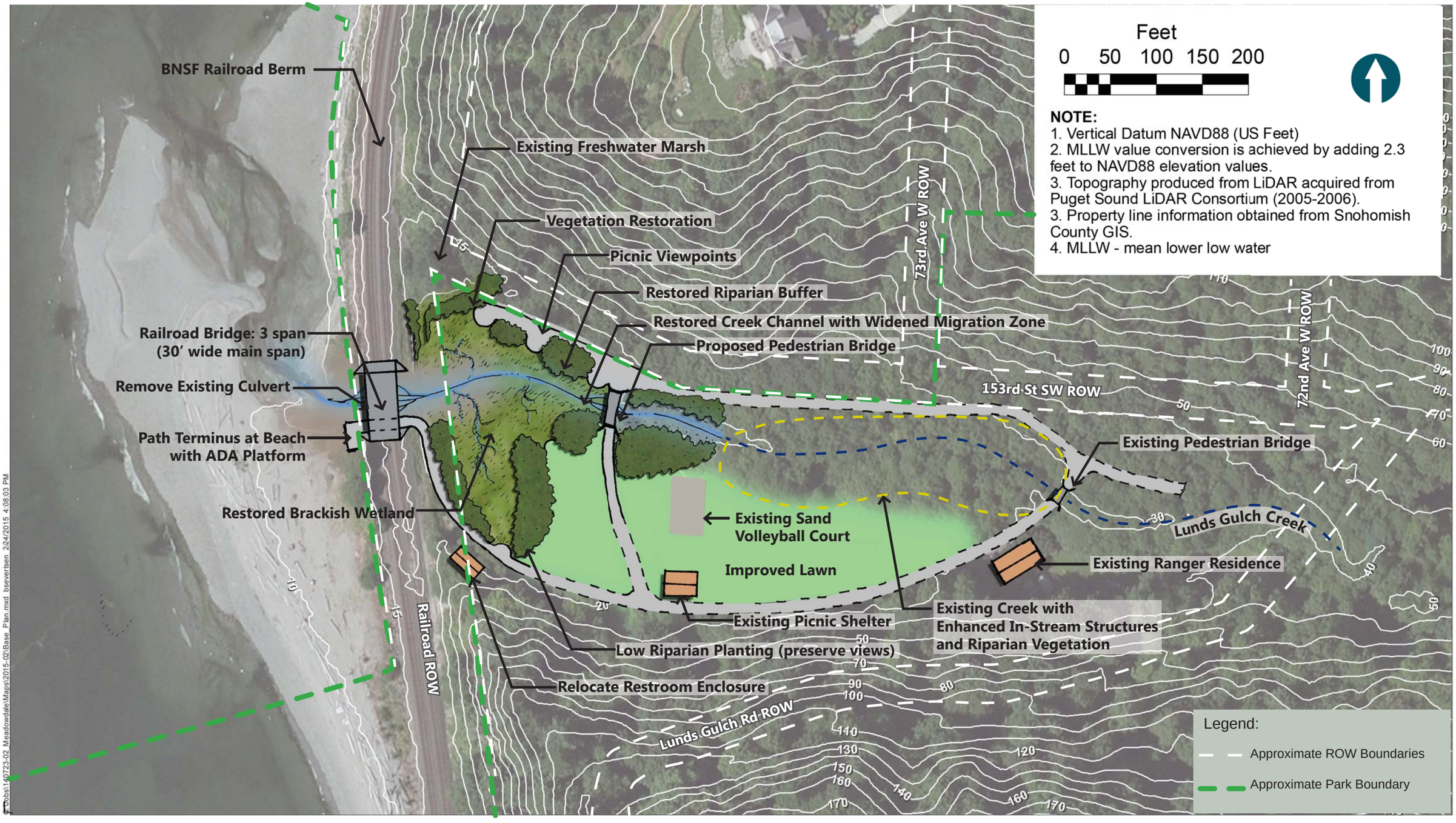
Exhibits were prepared by Anchor QEA, LLC for Snohomish County for the "Conceptual Alternatives Discussion Meeting" on February 26, 2015.
Revised on 3/9/2015 based on County feedback.



Alternative 1: Three Span Bridge, Combined Creek and Pedestrian Access Route, 50% of Lower Lawn Converted to Habitat

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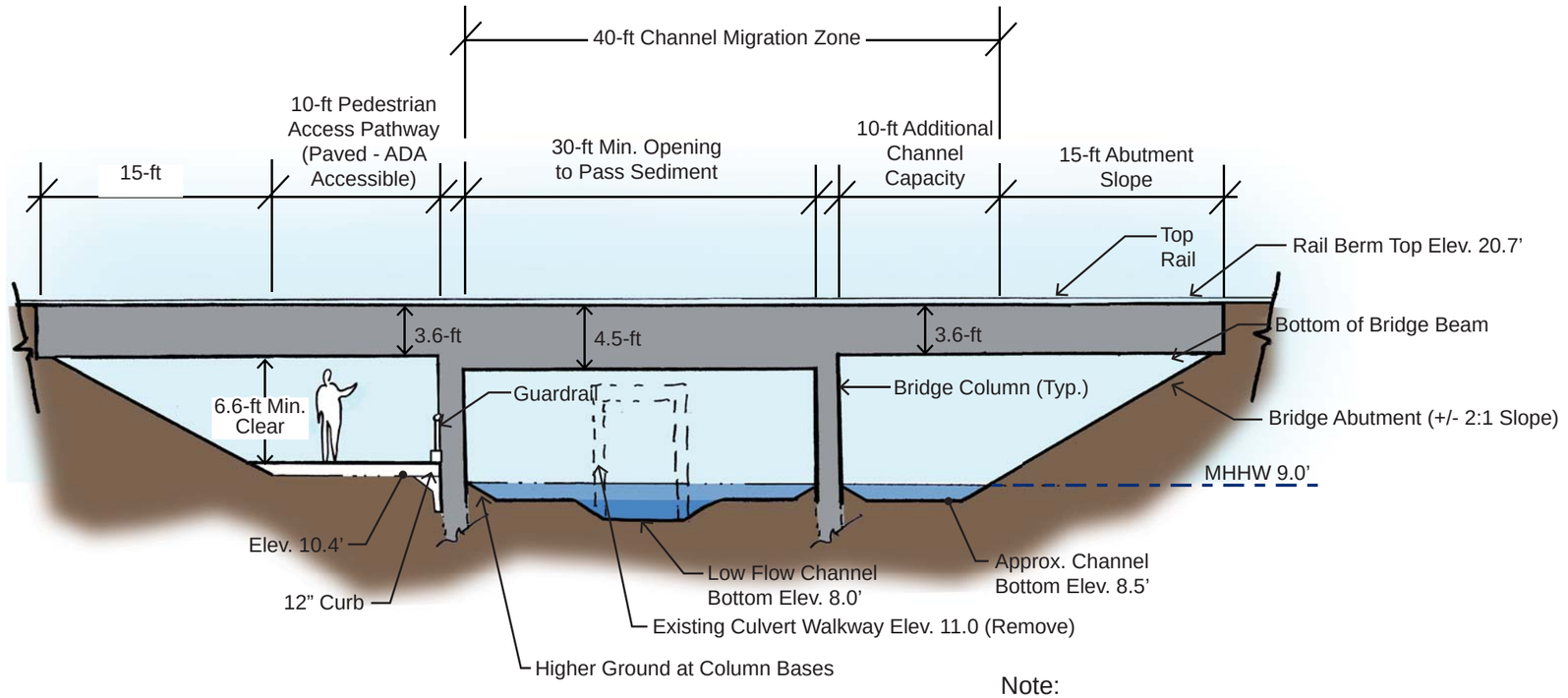

Elevation Looking West

Note:

1. Vertical Datum NAVD88 (US Feet).
2. MLLW elevations can be obtained by adding 2.3 feet to NAVD88 elevation values.
3. Topography produced from LiDAR acquired from Puget Sound LiDAR Consortium (2005-2006)
4. Geometry of existing culvert taken from Puget Sound Tributaries Drainage Needs Report (Snohomish County, 2002)
5. MLLW - mean lower low water
6. MHHW - mean higher high water
7. Channel elevations shown are conceptual and may be modified based on results of hydraulic modeling or during project design.

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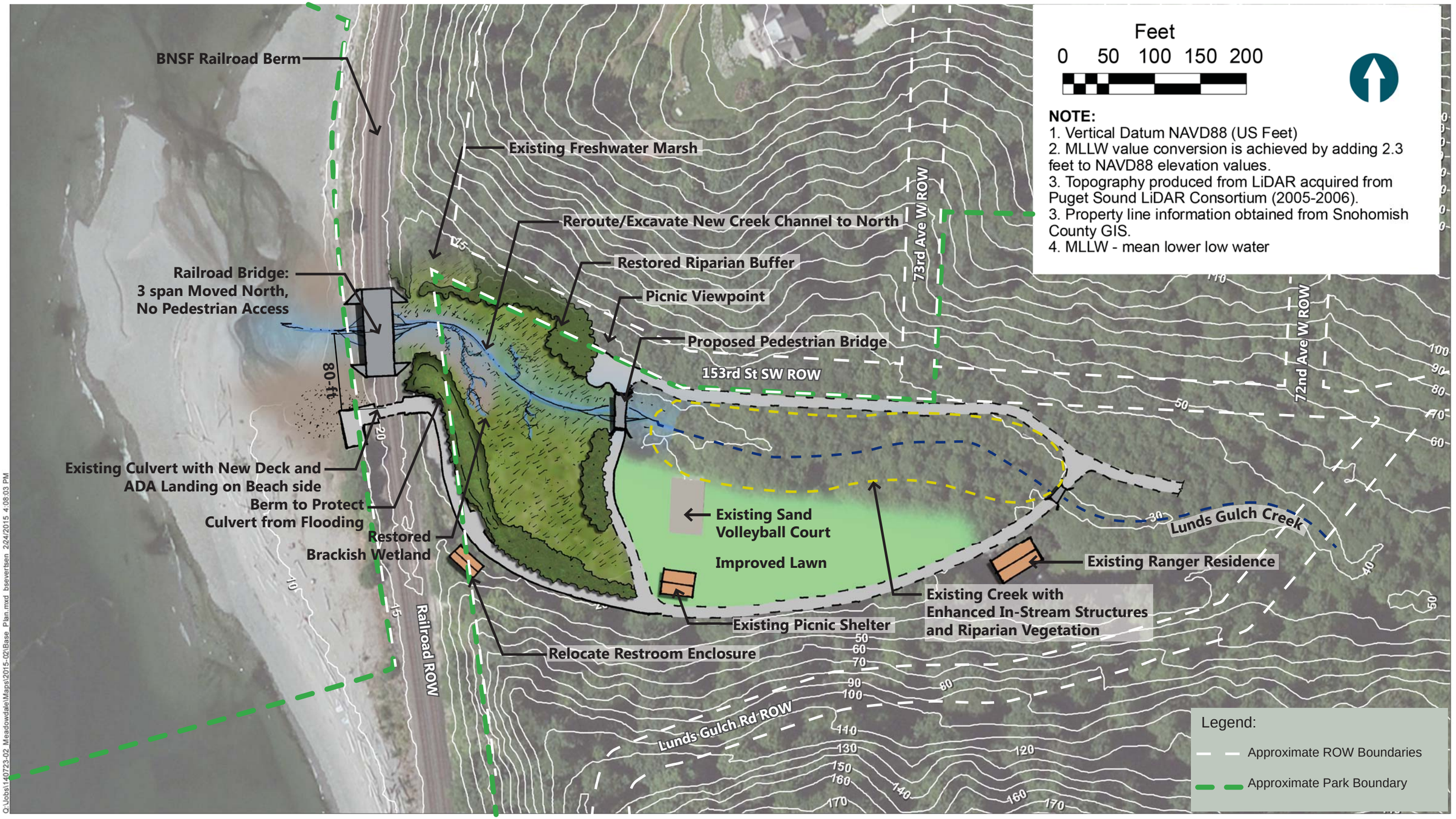
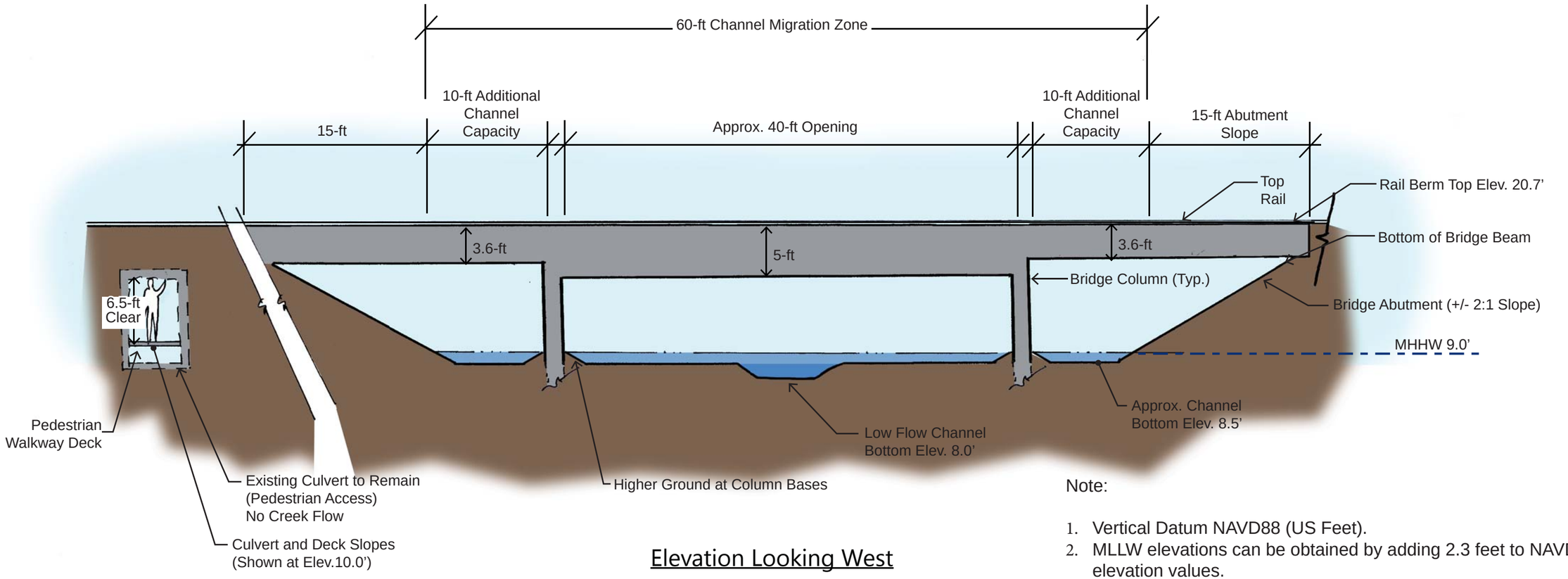


Alternative 2: Existing Tunnel and Three Span Bridge, Separated Creek and Pedestrian Access Routes, 100% of Lower Lawn Converted to Habitat



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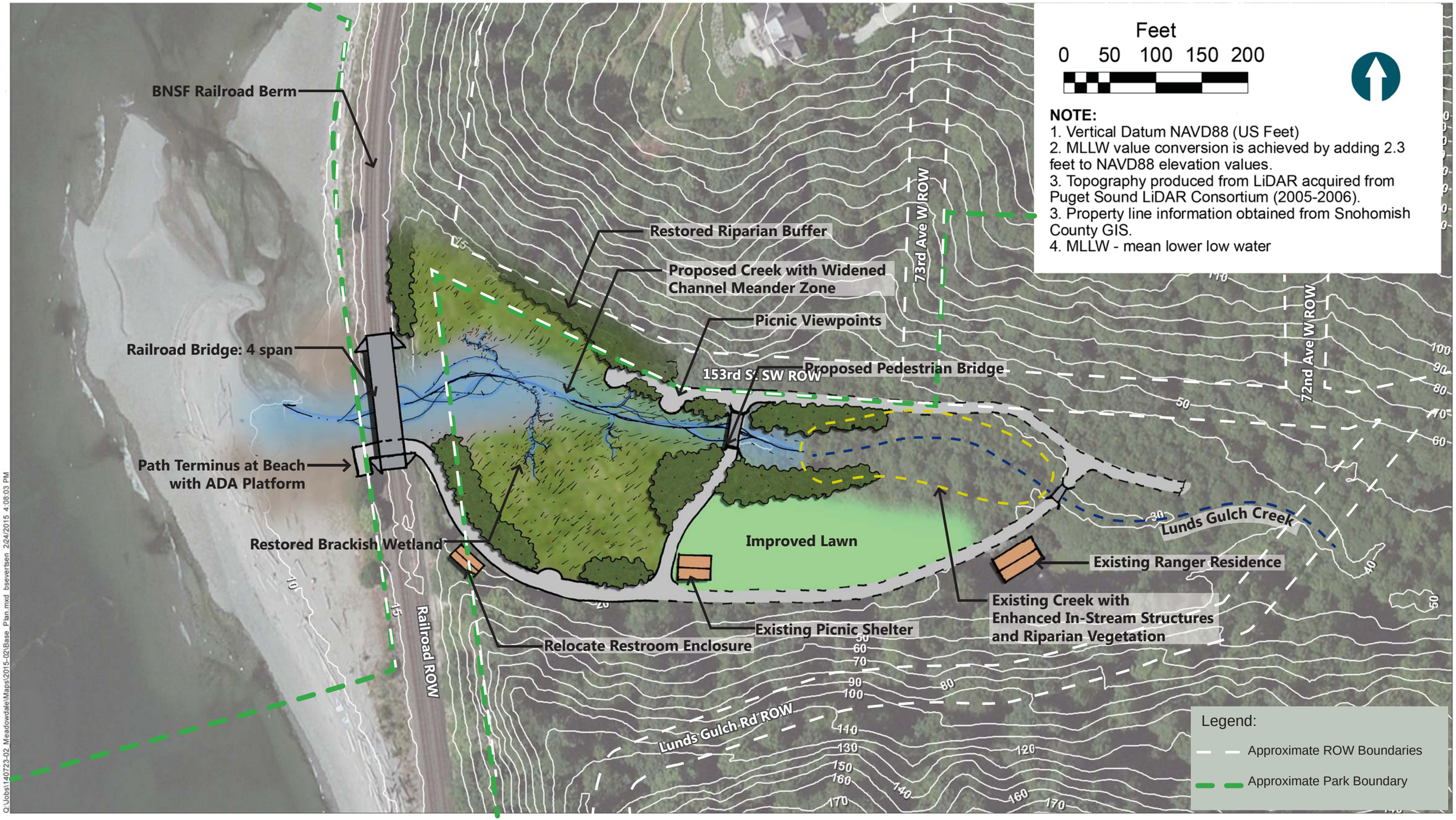
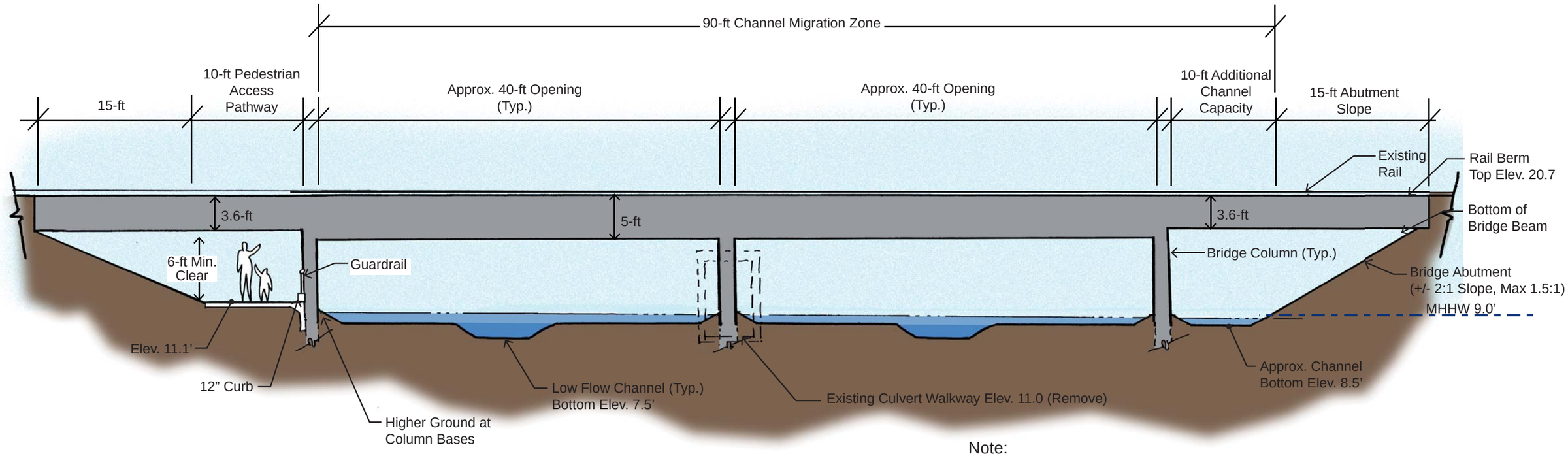


Alternative 3: Four Span Bridge, Combined Creek and Pedestrian Access Route, 100% of Lower Lawn and 30% Upper Lawn Converted to Habitat



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